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PROJECT CHECO SOUTHEAST ASIA REPORT

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**AERIAL REFUELING
IN SOUTHEAST ASIA
1964-1970**

Downgraded from Secret
to Confidential on
14 June 1989 by
Susan Spillman by
authority of HQ
USAF (AF/SAL)
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14. ABSTRACT Project CHECO was established in 1962 to document and analyze air operations in Southeast Asia. Over the years the meaning of the acronym changed several times to reflect the escalation of operations: Current Historical Evaluation of Counterinsurgency Operations, Contemporary Historical Evaluation of Combat Operations and Contemporary Historical Examination of Current Operations. Project CHECO and other U. S. Air Force Historical study programs provided the Air Force with timely and lasting corporate insights into operational, conceptual and doctrinal lessons from the war in SEA.					
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Examination of
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REPORT

AERIAL REFUELING IN SOUTHEAST ASIA
1964-1970

17 JUNE 1971

HQ PACAF

Directorate of Operations Analysis
CHECO/CORONA HARVEST DIVISION

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PROJECT CHECO REPORTS

The counterinsurgency and unconventional warfare environment of Southeast Asia has resulted in the employment of USAF airpower to meet a multitude of requirements. The varied applications of airpower have involved the full spectrum of USAF aerospace vehicles, support equipment, and manpower. As a result, there has been an accumulation of operational data and experiences that, as a priority, must be collected, documented, and analyzed as to current and future impact upon USAF policies, concepts, and doctrine.

Fortunately, the value of collecting and documenting our SEA experiences was recognized at an early date. In 1962, Hq USAF directed CINCPACAF to establish an activity that would be primarily responsive to Air Staff requirements and direction, and would provide timely and analytical studies of USAF combat operations in SEA.

Project CHECO, an acronym for Contemporary Historical Examination of Current Operations, was established to meet this Air Staff requirement. Managed by Hq PACAF, with elements at Hq 7AF and 7AF/13AF, Project CHECO provides a scholarly, "on-going" historical examination, documentation, and reporting on USAF policies, concepts, and doctrine in PACOM. This CHECO report is part of the overall documentation and examination which is being accomplished. It is an authentic source for an assessment of the effectiveness of USAF airpower in PACOM when used in proper context. The reader must view the study in relation to the events and circumstances at the time of its preparation--recognizing that it was prepared on a contemporary basis which restricted perspective and that the author's research was limited to records available within his local headquarters area.


ROLAND A. CAMPBELL, Major General, USAF
Chief of Staff

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Maurice L. Griffith
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FOREWORD

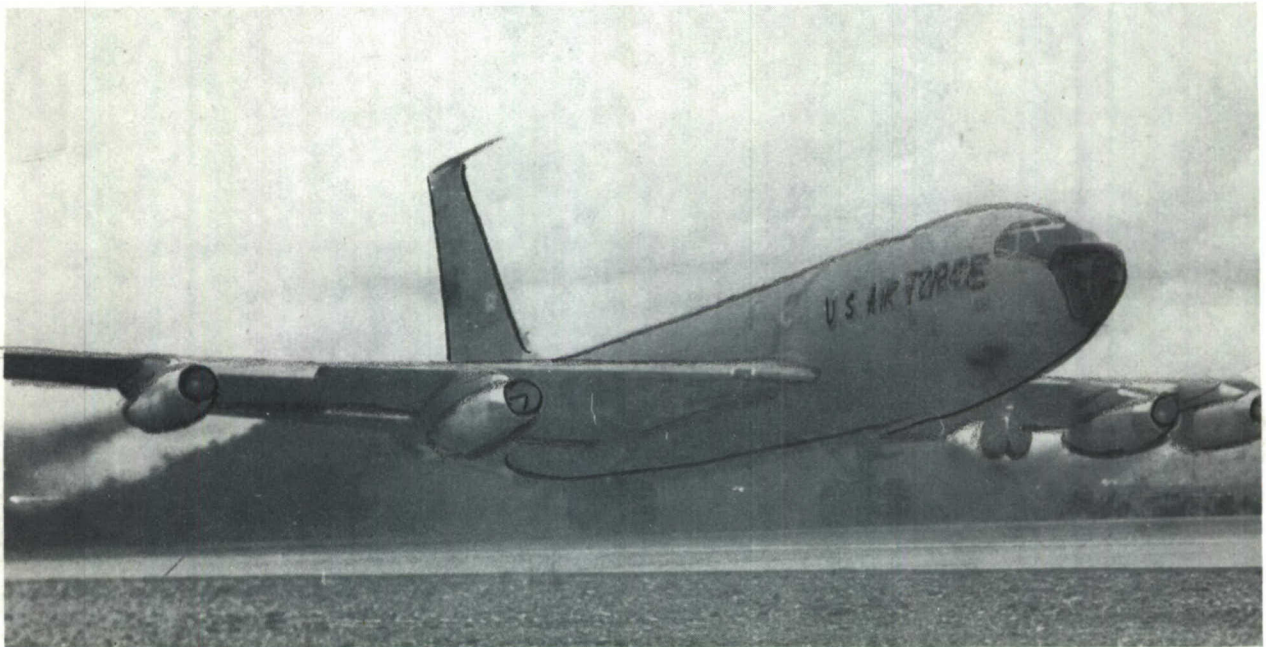
The aerial tankers of the United States Air Force employed in Southeast Asia were assigned the tasks of refueling both tactical and strategic aircraft as well as providing communications relay and logistical support. Their refueling operations were absolutely indispensable to the conduct of numerous air campaigns most notably tactical fighter operations deep into North Vietnam and saturation bombing missions launched from Guam. The majority of the refueling tactics employed in SEA were developed during the period covered by this report. Chapter I deals with these procedures; Chapter II outlines the refueling and supplemental missions for which the aerial tankers were responsible; Chapter III is a chronology of the operations for the period of this report, June 1964 - December 1970.

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CHAPTER I

THE AERIAL TANKER AND REFUELING TACTICS

The single manager for the aerial refueling of all fixed wing U.S. Air Force aircraft employed in Southeast Asia was the Strategic Air Command.^{1/} The tanker employed was the KC-135, an aircraft which was originally designed as an aerial tanker and was ideally suited to that task.^{2/} Despite the tankers capacity to hold almost 200,000 pounds of fuel, high temperatures, wet runways and power limited engines reduced takeoff fuel loads at tropical operating locations to 150,000 pounds.^{3/} In addition to its primary mission, the aircraft's cargo, passenger carrying and flight endurance capabilities were exploited during SEA operations.^{4/}



KC-135 Stratotanker

Figure 1

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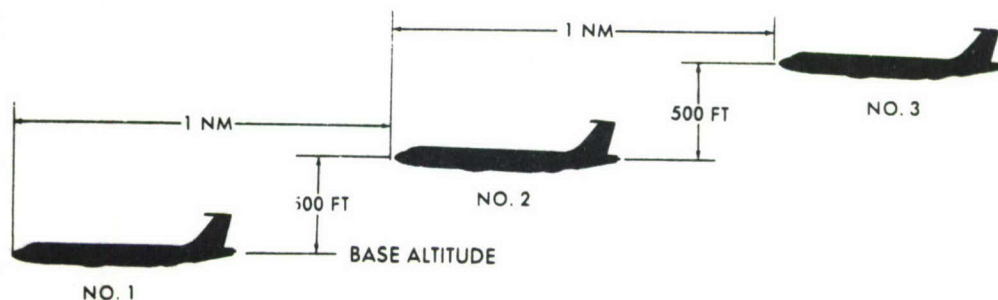
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AIR REFUELING CONCEPT

In-flight fuel transfer usually took place in preplanned refueling areas containing specific points and tracks for the tankers and their receivers to rendezvous. One tanker constituted an air refueling element. When multiple tankers were required to support the mission, cell formations were formed.^{5/} An average of seven refuelings were conducted with tactical aircraft by each tanker sortie with total fuel offloads averaging 55,000 pounds. B-52, RC-135 and SR-71 refueling sorties requiring offloads of up to 80,000 pounds were common.^{6/}

ENROUTE CELL

Tanker cells flew an intrail formation enroute to the refueling areas. After takeoff, cell closure was achieved by the execution of planned turns or differential airspeed. Aircraft were stacked at 500 foot altitude intervals with one nautical mile horizontal separation. The desired distance between aircraft was obtained using search radar.^{7/}



Enroute Tanker Cell Formation

Figure 2

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RENDEZVOUS

Tactics were established which enabled the receiver aircraft to reach the precontact refueling position behind his assigned tanker ready to initiate aerial refueling. The planned geographical position of the rendezvous was known as the Air Refueling Control Point (ARCP).

Electronic, radio, and visual means were employed to assist in effecting the rendezvous. Air-to-air TACAN, UHF DF steers, radar beacons, GCI vectors, search radar and radio communications were the principle aids.

The rendezvous equipment available in the tankers and receivers varied and was not always compatible.^{8/}

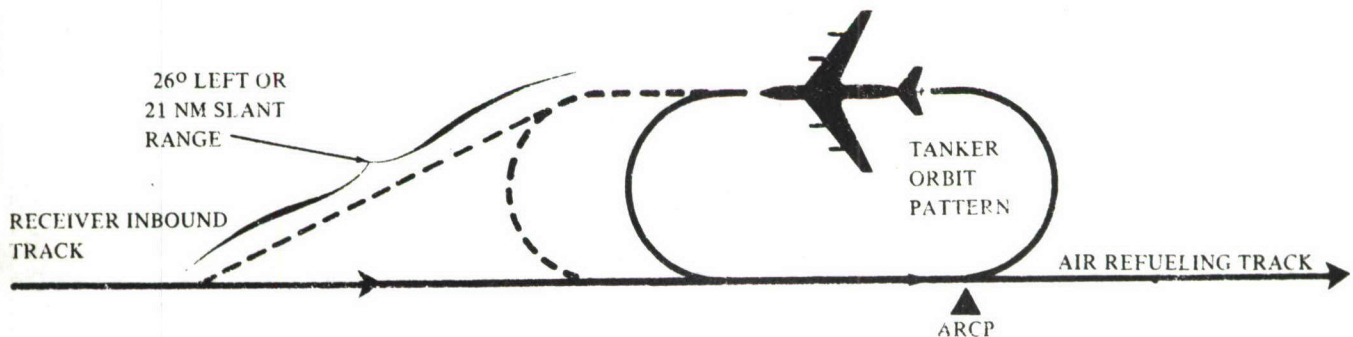
TYPE OF RECEIVER	PRIMARY RENDEZVOUS EQUIPMENT
B-52	Radar Beacon
RC-135	Radar Beacon Air-to-Air TACAN
F-100	UHF Radio-GCI Radar
F-104	UHF Radio-GCI Radar
F-105	UHF Radio-GCI Radar UHF/DF Radar Beacon
F/RF-4	UHF Radio-GCI Radar UHF/DF Air-to-Air TACAN (RF-4)
F-5	UHF Radio-GCI Radar
EB-66	UHF Radio-GCI Radar UHF/DF Radar Beacon

Rendezvous Equipment

Figure 3

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When using the point rendezvous tactic, the tanker arrived at the ARCP 15 minutes prior to the scheduled Air Refueling Control Time (ARCT). At the ARCP, a racetrack orbit pattern to the left was maintained with the control point located at the downstream end of the pattern. The tanker executed his final turn in the orbit so that he intercepted his receiver's inbound track just in front of him completing the rendezvous.^{9/}

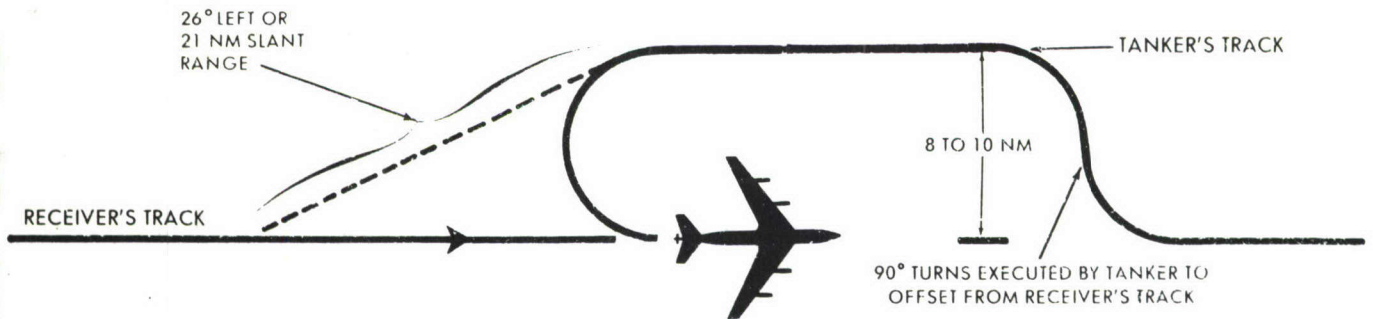


Point Rendezvous
Azimuth and range shown are for fighter aircraft

Figure 4

Head-on-rendezvous were used when a receiver was critically short of fuel and rapid rates of closure were necessary. Both aircraft flew head-on-tracks. The tanker offset his track to the right of the receiver by executing a 90 degree turn to the right followed almost immediately by a 90 degree turn to the left. Racing towards each other, with the tanker's track approximately ten nautical miles to the right of the receivers, the tanker initiated a 180 degree turn when their range had closed to a point where he would intercept his thirsty receiver's track just in front of him.^{10/}

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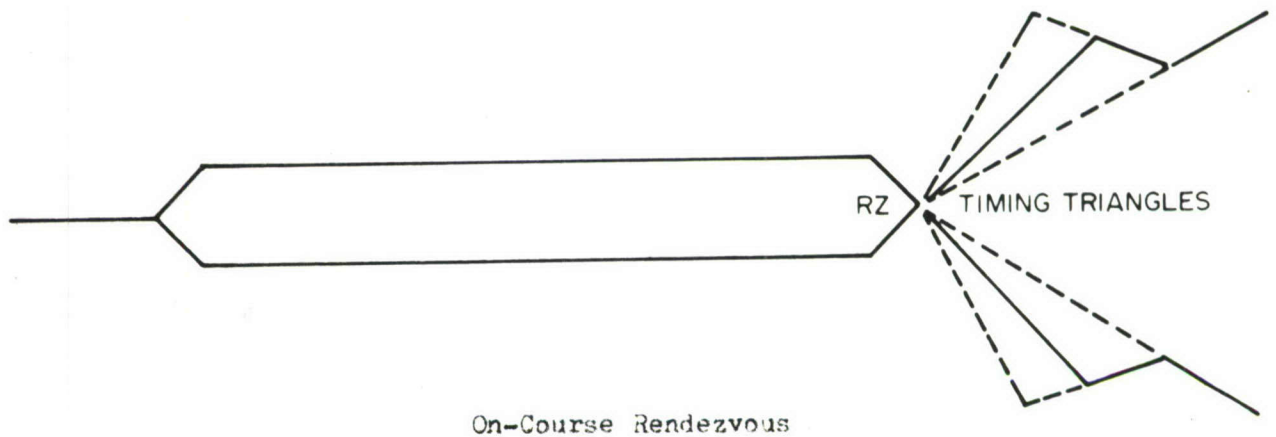
Head-on-rendezvous

Figure 5

On-course rendezvous tactics were used for refueling large streams of bomber aircraft. Tanker and bomber cells were jointly responsible for controlling the arrival time of their individual formations to the rendezvous point (RZ), the tankers programmed over the RZ one minute prior to their mated receivers. Timing triangles were used to control arrival at the specified control time. In order to provide spacing for mass refuelings, two parallel tracks separated by 30-50 nautical miles were employed. The cells alternately proceeded right and left oblique from the rendezvous point until they intercepted their assigned refueling track. The tanker cell remained in the enroute cell formation until established on the refueling heading and then echeloned to the air refueling formation.^{11/}

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On-Course Rendezvous

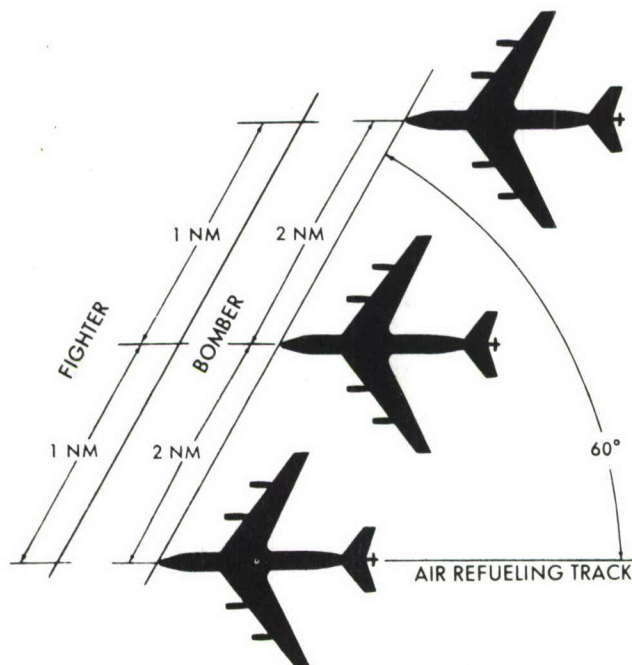
Figure 6

AIR REFUELING FORMATION

Echelon formations were used when refuelings involved multiple tankers. Each tanker flew an assigned altitude and bearing relative to the tanker ahead of him in the cell. The desired echelon angle was maintained with the search radar. The basic air refueling formation was a 60 degree right echelon with one nautical mile separation when tactical aircraft were being refueled and two nautical miles when the receivers were B-52s. Altitude stacking was established to provide vertical separation. When the refueling element consisted of tactical receivers, the vertical separation was 500 feet between tankers. When two or more B-52s were being refueled by one tanker, the stacking was arranged to provide 500 feet of altitude between the bombers.^{12/} Modification of this formation was often dictated by weather conditions in Southeast Asia.^{13/}

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Air Refueling Formation

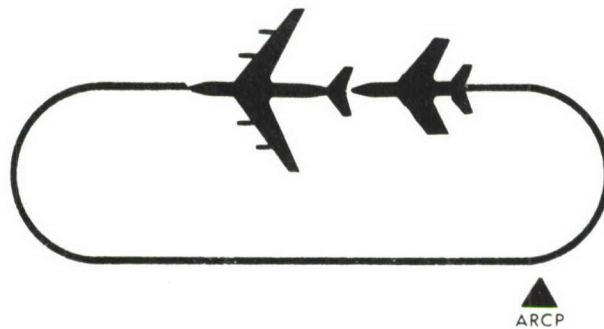
Figure 7

REFUELING AREA CONTROL

Refuelings were conducted along refueling tracks extending downstream from the Air Refueling Control Point or in refueling anchors. Anchor refueling became the primary tactic used in conjunction with tactical support operations. A lefthand racetrack anchored to the ARCP was used. Shallow turns were made and the fuel transferred while flying in an elongated orbit.^{14/}

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Anchor Refueling

Figure 8

The intensity of tactical air operations demanded the implementation of a system which would provide aircraft separation, expeditious rendezvous and continuous control of airborne refueling resources. The Southeast Asia Tactical Air Control System (TACS) was utilized to fill this need. The system was based on the use of Ground Control Intercept (GCI) Radar to maintain tracking of both tanker and receiver aircraft. The TACS maintained Control and Reporting Centers (CRCs) which provided radar coverage of the tactical refueling areas. The CRCs were provided refueling fragmentary operation orders and direct communication links with the Command Center at Tan Son Nhut Airfield, RVN. In this manner cell separation was provided, rendezvous expedited, and real-time monitoring of unscheduled refueling requirements could be coordinated and relayed to the aircrews.^{15/}

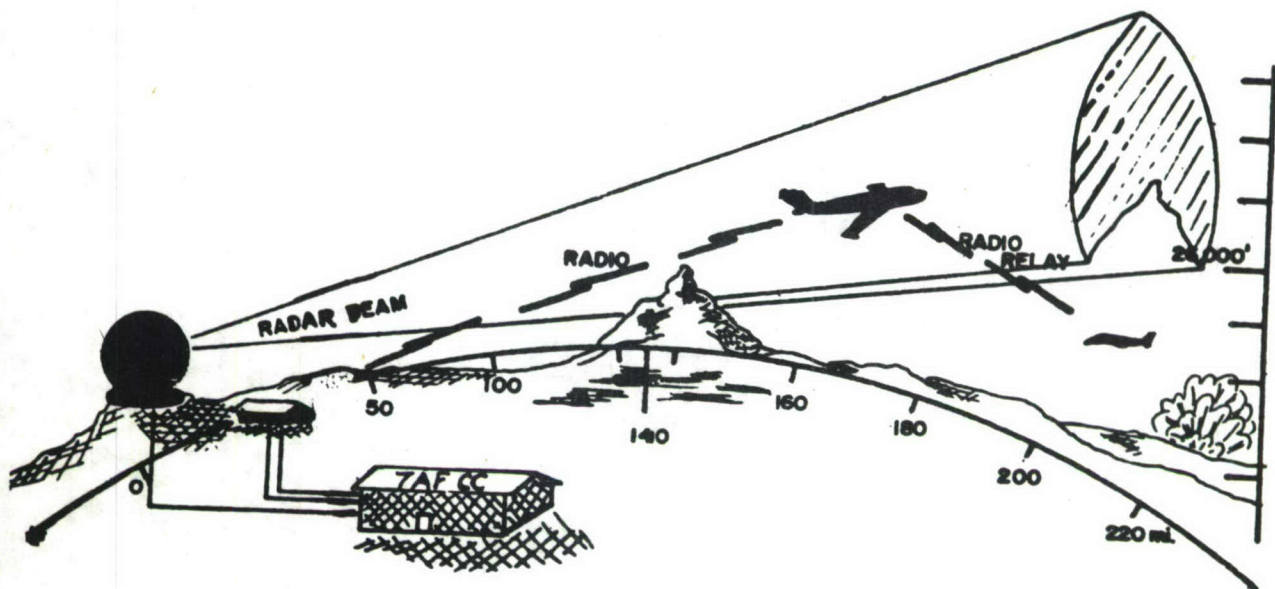
In 1969, the Chief of the SAC ADVON at 7th Air Force said of the TACS:^{16/}

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We have found that the GCI sites which control the refueling orbits in SEA are outstanding. As they have gained experience, it has been possible to decrease time intervals between aircraft, fly larger formations to contact position, and depend on the site to invariably complete rendezvous and respond immediately to emergencies and airspace conflicts. Their performance has been absolutely superior.

Line of sight radar coverage limitations encountered, especially during poststrike refuelings, were alleviated by the higher flying tankers who acted as relay stations for their receivers until contact could be established by GCI.^{17/}



Refueling Area Control

Figure 9

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BOOM AIR REFUELING

To accomplish their mission, tankers were equipped with a flying boom to transfer fuel. The boom was controlled by the tanker crew using the boom's ruddervators. The receiver aircraft positioned himself directly behind and slightly below his tanker, the boom nozzle was directed into the inflight fuel receptacle, the two aircraft became physically joined together, and fuel transfer began. ^{18/}



Boom Air Refueling

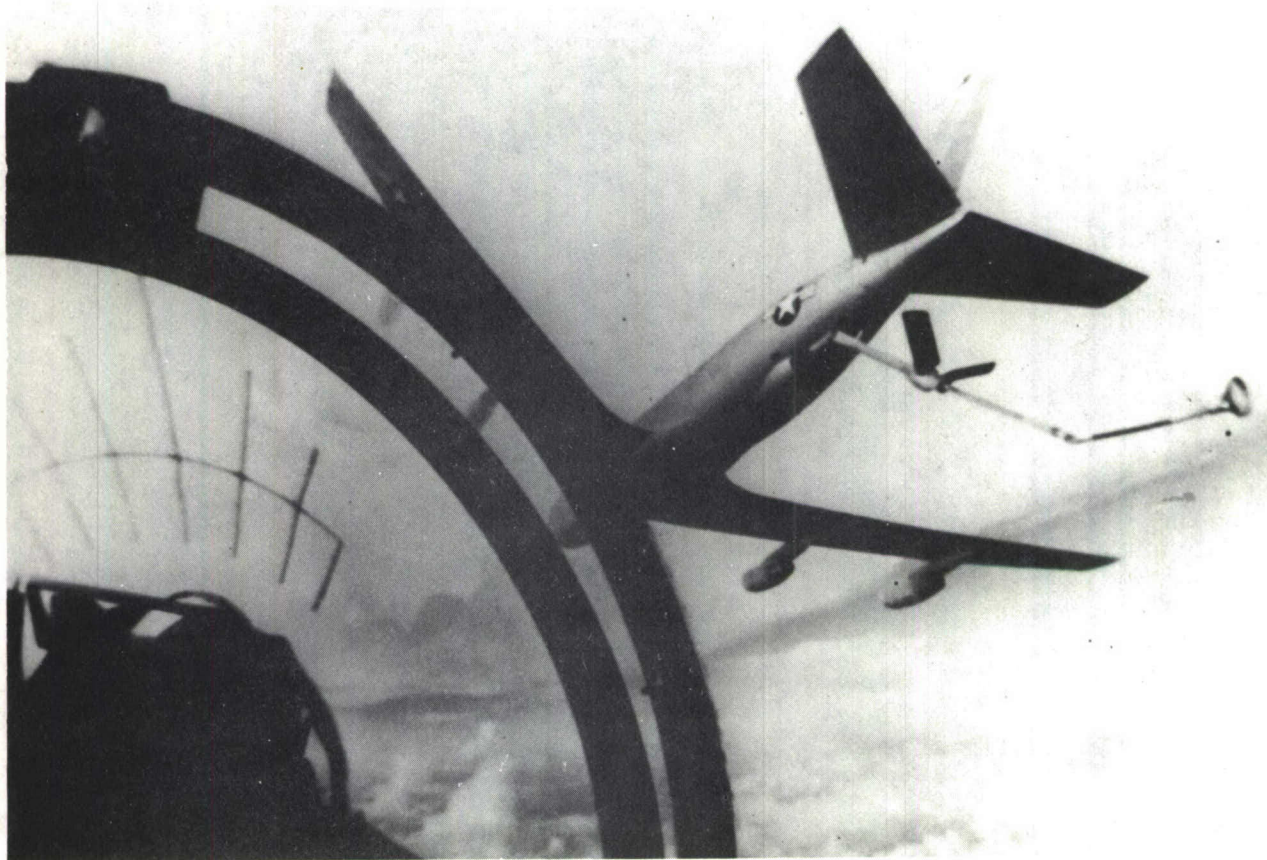
FIGURE 10

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PROBE AND DROGUE REFUELING

When missions were flown in support of receiver aircraft not equipped with an inflight refueling receptacle, a drogue adapter kit was installed on the boom. In this configuration, the boom was maintained in a stable flight position and the receiver made the maneuvers to effect the mating.^{19/}



Probe and Drogue Refueling

Figure 11

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AERODYNAMIC FACTORS

When both tanker and receiver maintained their position in the normal refueling envelope, aircraft control did not present a problem to the aircrews. However, the following description from the KC-135 Flight Manual reflects the serious consequences if the receiver underran his tanker. ^{20/}

The direction of the disturbing force is different for every relative position, but generally, the force is in the direction to bring the two aircraft closer together. Consider a B-52 under running a KC-135 during an attempt to formate for refueling. If the center lines of the two aircraft coincide, they will tend to fly together and the B-52 pilot must push on the control column to maintain clearance.

As the B-52 wing passes forward of the KC-135 wing, it passes from a region of downwash to a region of upwash and the lift is suddenly increased; therefore, the B-52 pilot must strongly increase the push force at this time to prevent pitching up into the tanker. If the B-52 were to underrun the tanker to one side so that their wings overlapped on one side only, the pitching tendency would not be quite as strong, but the overlapping wings would pull together unless checked by opposite aileron.

During fuel transfer, the relative weight changes of the tanker and the receiver altered the flight characteristics of the two aircraft and required constant trim and power adjustments by both aircrews. ^{21/}

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CHAPTER II

THE REFUELING MISSIONS

The stage was set in the late 1950s for the KC-135 tanker's role in support of SEA operations. Refueling strategic bombers was the aircraft's original mission, while the tactical forces had been using the KB-29 and KB-50. However, the propeller driven tankers were inadequate for the newer jet fighters. KC-135 compatibility tests with aircraft in the tactical inventory were conducted in 1959. SAC became Air Force's single manager for aerial tankers in 1961 and began to support tactical units on deployments. In 1963, KC-135s provided 9,500 refuelings to deploying fighters.^{22/} Operation Desert Strike, held in 1964 marked the first time that jet tankers had supported tactical forces during the strike phase of a tactical exercise. This proved to be a timely exercise as the initial employment of tankers in support of SEA tactical strike missions occurred in June 1964.^{23/} The original components of this Task Force were diverted to Clark AB, Philippines while in the PACAF region supporting a deployment to Japan.^{24/} The first employment was in support of Yankee Team strikes by F-100s in Laos. Initially Yankee Team was also supported by KB-50 tankers; however, they were withdrawn in October leaving the KC-135 with full responsibility. By late fall, a directive outlining aerial refueling objectives in WESTPAC was issued. The primary objective of supporting SAC and PACAF refueling requirements remained unchanged throughout the period of this report.^{25/}

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Permanently assigned tankers were never based in SEA; both aircraft and crews were assigned on a TDY basis. Deployments for operations plans designed to support tactical missions drew aircraft and crews on an individual basis from all CONUS refueling squadrons assigned to SAC. The rotation of aircraft and crews was staggered to establish an even flow of intertheater movements.^{26/} A second category of deployment developed in 1965 when additional tankers arrived to support B-52s. Tankers and crews deployed to provide for B-52 requirements consisted of the refueling squadrons assigned to the bomb wings tasked with the saturation bombing mission. These tankers accompanied the bomber squadrons from their parent wing. In order to provide equitable sortie rates for both aircraft and crews, the tanker forces were organized into integrated units and scheduled against all SEA refueling requirements regardless of the operations plan under which their deployment had taken place.^{27/}

Airborne refueling in direct support of combat operations was the principle "raison d'etre" of the tanker force; however, several supplemental objectives were added during the years and will be outlined in this chapter along with the primary missions.^{28/} Levels of activity and operating locations were constantly changing and will be discussed in Chapter III. A series of narratives are used in this chapter as a means of describing SEA refueling operations. Although the narratives selected are most decidedly not taken from routine mission reports, their texts reflect the character of the day-to-day operation while at

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the same time providing an insight into the dedication and skill of the aircrews who participated.

REFUELING TACTICAL AIRCRAFT

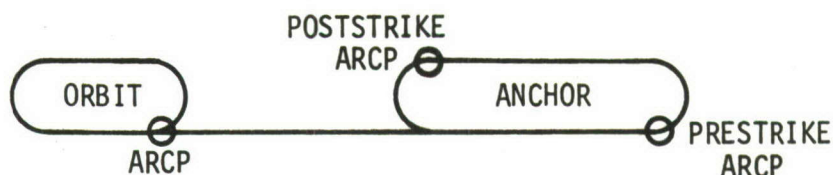
Prestrike and poststrike refuelings of tactical aircraft engaged in combat operations were conducted in refueling areas established over the Gulf of Tonkin, South Vietnam, Thailand, and later over Laos and Cambodia. Tactical refuelings were conducted both in anchor orbits and along refueling tracks. Each ARCP was assigned a nickname. The tanker's radio call sign incorporated the ARCP nickname plus the word "Anchor" if the refueling was to be conducted on an anchor. The numeric portion of the call sign indicated the tanker's assigned Mode 3 SIF setting used by the CRC for radar identification. For example, a tanker scheduled for refueling on Peach Anchor with a Mode 3 code of 55 carried a call sign of PEACH ANCHOR 55. The geographic location of the ARCP coupled with the distinctive SIF radar "blip" improved identification. If diverted to another area the tanker assumed the nickname of the new area in his call sign.

Anchors which were used for both prestrike and poststrike refuelings had separate ARCPs designated for each purpose. If an area also contained a refueling track it had a third ARCP at the orbit. ^{29/}

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Typical Air Refueling Area/ARCP/Track

Figure 12

During the period when large scale strike operations were being conducted against targets in North Vietnam, integrated refueling cells consisting of tankers, strike, ECM, MIG CAP and SAM/AAA suppression aircraft were massed in relatively small geographical areas at the same time. The arming of ordnance precluded launching all of the receivers in the strike force at the same time, making it necessary for the receivers to loiter with their tankers. Initially refueled to full tanks, the cells recycled onto their tanker's boom for "top offs" until the entire force was assembled. Thus, all the receivers had full tanks when they departed the tankers for their mission.

There were, on occasion, three refueling cells consisting of three tankers each and five receivers for each tanker all operating, at different altitudes, on the same refueling anchor. With as many as 54 aircraft simultaneously employing a single anchor, the value of the TACS is readily apparent. Additional components of the same strike force refueled in similar configurations in adjacent areas. Anchor orbit lengths were adjusted to expedite the rendezvous, provide

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separation between cells and to complete refueling at the desired time and position. It was the responsibility of the tanker to drop off his receivers at the specified time and position with full fuel loads. ^{30/}

Poststrike refuelings were scheduled during recovery and then cancelled if not required. Conservation of tanker resources to support desired levels of combat activity necessitated close coordination between the tactical planners and the tanker schedulers. Fuel for fighters flying RESCAP (MIG cover for rescue operations) was provided on an as-required basis--sometimes at or near the scene of the rescue operation. ^{31/}

The anchors and refueling tracks depicted in Figure 13 are a composite representation of those employed throughout the period.

The term "save" was used to reflect an air refueling with a receiver which had insufficient fuel to return to his base. In early 1965, the nickname Young Tiger was given to KC-135s refueling tactical fighters and reconnaissance aircraft in SEA. Young Tiger came to be a nickname revered by the consumer and borne proudly by the tanker crews. The "Save Scrapbook" of the 4252nd Strategic Wing contains the account of a battle-damaged fighter who was losing more fuel than the tanker was offloading to him. The tanker towed the fighter back to his base with it's boom, unlatching him on final approach. ^{32/}

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The following paraphrased account extracted from the transcript of GCI radio traffic and the tanker mission report describes a typical Young Tiger "save."^{33/}

The tanker was in the planned orbit awaiting four receivers scheduled for a poststrike refueling. Prevailing summer thunderstorms shrouded the orbit. GCI was vectoring the fighters for rendezvous. The first hint of trouble came when the fighter lead stated to his GCI controller "I don't see how you expect to join us up in this kind of weather." Three minutes later with the rendezvous still not effected, the fighters stated they had eight minutes of fuel remaining. Meanwhile the tanker was searching for a hole to refuel the now desperate receivers. Tanker and fighters were a scant 2 miles apart, but visual contact had still not been made. Tip tanks were punched off with seven minutes of fuel remaining. The fighters were tense now; "GCI get us together or we're going to have to eject." Then from the tanker "Level at base refueling altitude plus nine and in the clear." "Roger, Roger, climbing." The fighters began their climb with the lead triggering his radio mike button for a DF steer and his next transmission was: "I got you in sight. When we get behind you you're gonna have to let us on quick; we'll want about a thousand pounds apiece." The hole they had found to refuel in was about 6 miles wide and the tanker was continuously turning within these confines to maintain VFR. One fighter transmitted: "Don't you dare go IFR tank." Within three minutes, all four receivers had enough fuel to forestall flameout and were cycling back onto the boom for additional fuel. By this time, GCI was vectoring in the next flight of receivers.

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KC-135 Refueling F-4s

Figure 14

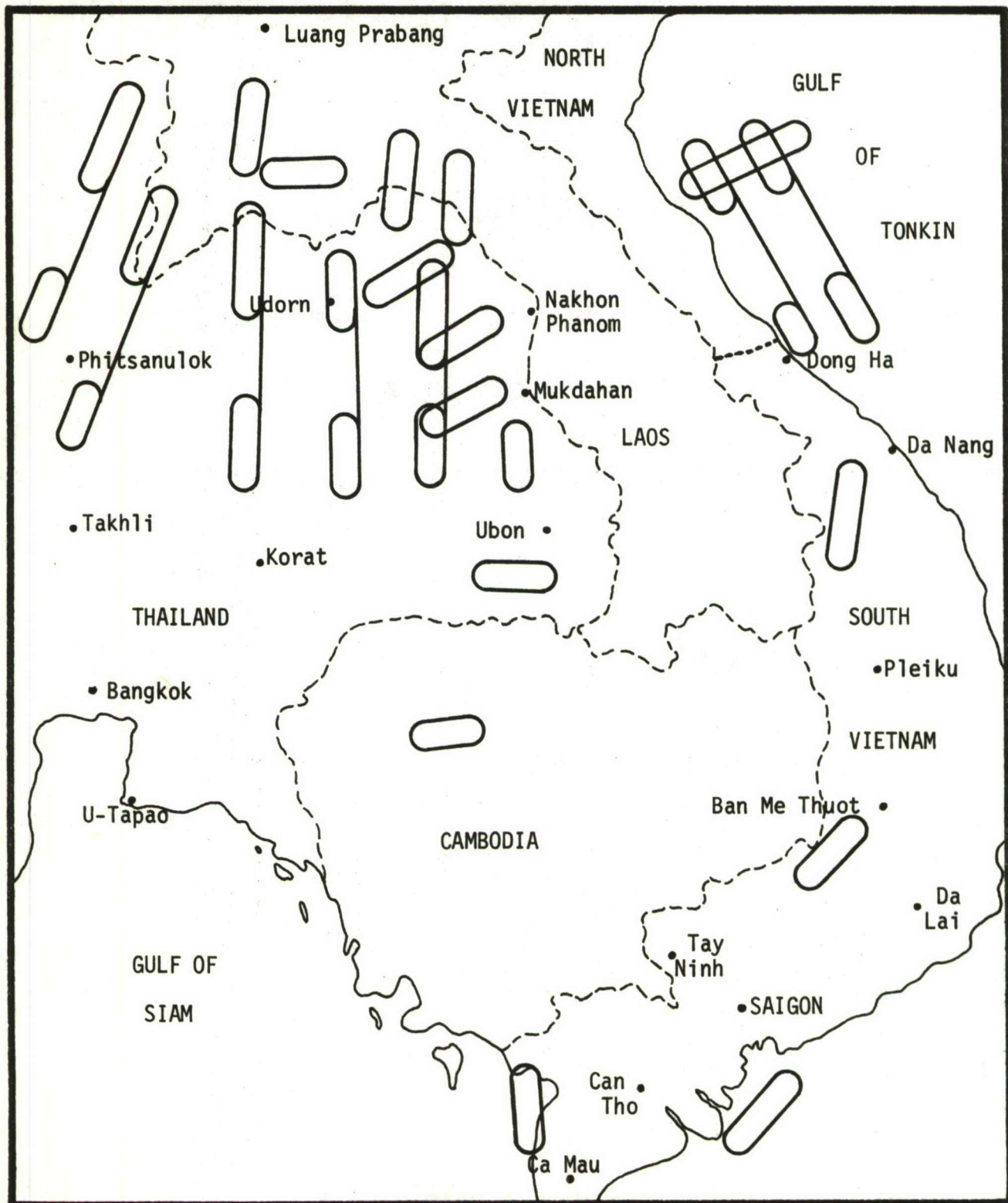
The narrative which follows was written by a receiver pilot who was obviously grateful for the air refueling support provided. A very strong rapport was established between the tanker aircrews and their receivers. This rapport led to numerous instances of tankers flying "over the fence" into the Barrel Roll area of Laos and even into North Vietnam itself in order to provide fuel. Refueling outside of sanctuary areas was never planned or directed. ^{34/}

On 19 April 1967, I was PANDA 3 in PANDA flight, a flight of 4 F-105 Thunderchiefs assigned the mission of destroying a target in North Vietnam. We delivered ordnance on the target and left for poststrike refueling. After we accomplished poststrike refueling we were directed to fly RESCAP for an F-105 crew

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FIGHTER AND RECONNAISSANCE REFUELING AREAS

FIGURE 13

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which had been shot down over North Vietnam. As we entered the area of the downed aircraft we were requested to help a rescue A-1E which was under attack by 4 MIG-17s. The ensuing air battle resulted in at least one MIG destroyed and two damaged.

After leaving the target area I climbed to FL300 and observed that I had 1000 pounds of fuel remaining. I immediately declared an emergency and requested vector from Brigham Control (the CRC at Udorn, Thailand) to the nearest tanker. Shortly thereafter they gave me a vector of 250° at 90 miles. I fully expected from that moment on that I would flameout prior to refueling. Perhaps in the heat of this critical situation Brigham failed to tell me who the tanker would be or I did not hear it. At any rate the majority of the rendezvous was accomplished by direct communications between myself and the tanker. Brigham turned the tankers in front of me too soon and I found myself in trail with them and approaching thunderstorms. The distance was narrowed to about three to four miles and I had only about 100 pounds of fuel remaining. I had anticipated a marginal rendezvous and requested the tankers to come up to FL300. They were at FL300 when I first observed them on radar. I had turned my radar on because Brigham was providing insufficient information. As soon as I acquired the tanker visually I requested that he slow down as much as possible and start descending. This put the tanker in the position of going from full military climb and red line airspeed to minimum power and a rapid descent. They did this perfectly and immediately. I required no power from three miles in trail to the time I got on the tanker. I initially overshot the tanker and as I finally approached the boom I encountered vertigo and disorientation due to the darkness and haze. The boom operator fearlessly and expertly connected with my receptacle. This was no small task because I was very erratic on my initial attempts to make contact. I estimate that at the time I got on the boom I had less than thirty seconds of fuel remaining. 35/

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KC-135 Refueling F-105s

Figure 15

REFUELING STRATEGIC AIRCRAFT EMPLOYED IN SEA

Aerial refueling was required to support two SAC Southeast Asia operations, saturation bombing missions and reconnaissance. The refueling conducted in support of these operations was relatively routine for the tankers, taking place in friendly skies away from the combat zone, conducted with aircraft and crews assigned to the same major air command.

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B-52 saturation bombing missions operated under the nickname Arc Light. For over two years, all B-52 Arc Light aircraft were based at Andersen AFB, Guam. Heavy bomb loads and the 5,000 mile round trip to the target area required air refueling support to complete the mission. When portions of the Arc Light bomber force were moved to Okinawa, top offs were sometimes required; however, no support was required for the bombers later based in Thailand. The bombing sorties from Andersen were planned for a ratio of one tanker for one bomber. Portions of the tanker force then recycled through Clark AB, Philippines and provided poststrike refueling as required. During prestrike, if a tanker aborted, two KC-135s provided "odd ball" refueling for three B-52s and the number of tankers recycling was adjusted to increase poststrike capability. In November 1965, the on-course rendezvous procedure was implemented for Arc Light missions. This eliminated the tanker orbit at the ARCP and was an outgrowth of a midair collision between two B-52s on the first strike mission in June. ^{36/}

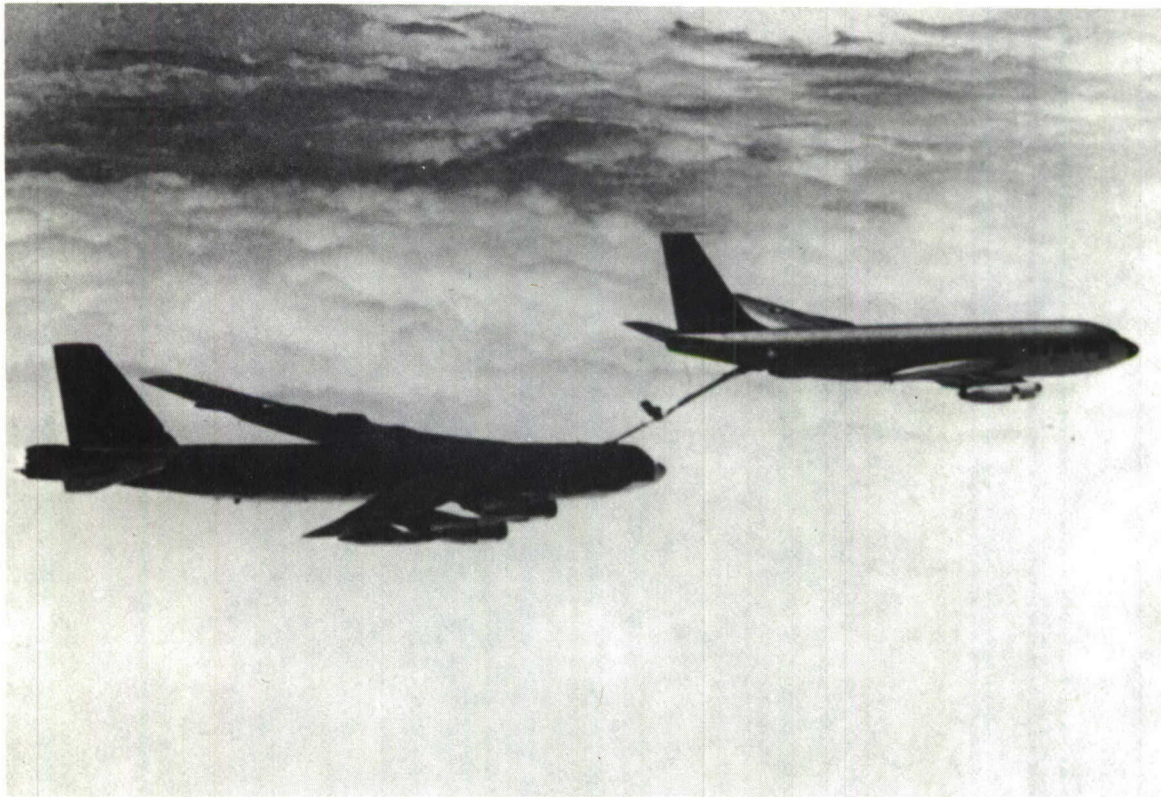
The Arc Light refueling areas were located in the vicinity of the Philippine Islands. Multiple areas were established to provide the flexibility required to avoid typhoons and other weather hazards; their locations were realigned several times due to airspace congestion. ^{37/}

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KC-135 Refueling B-52

Figure 17

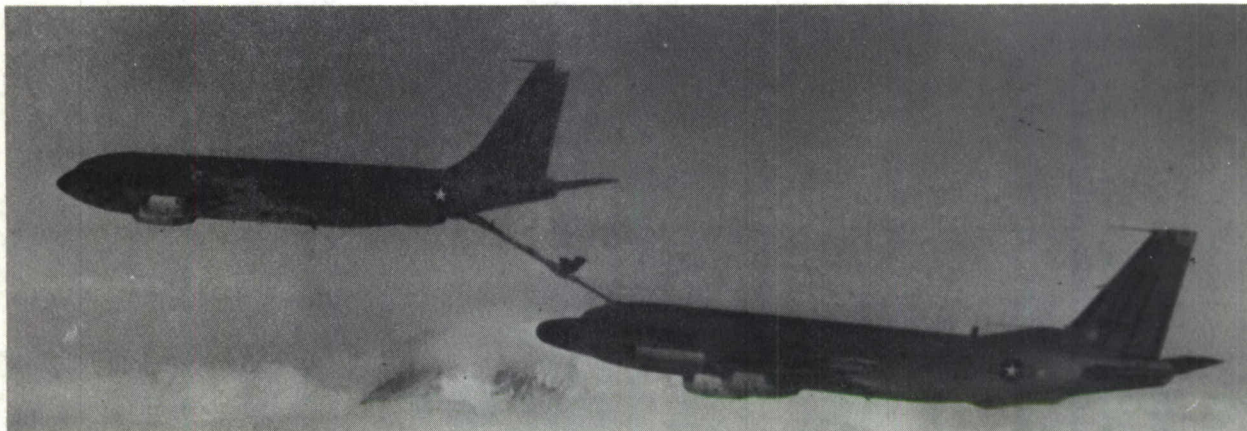
Refueling of RC-135 electronic intelligence (ELINT) gathering aircraft flying Combat Apple missions took place on tracks over Thailand and the Gulf of Tonkin.

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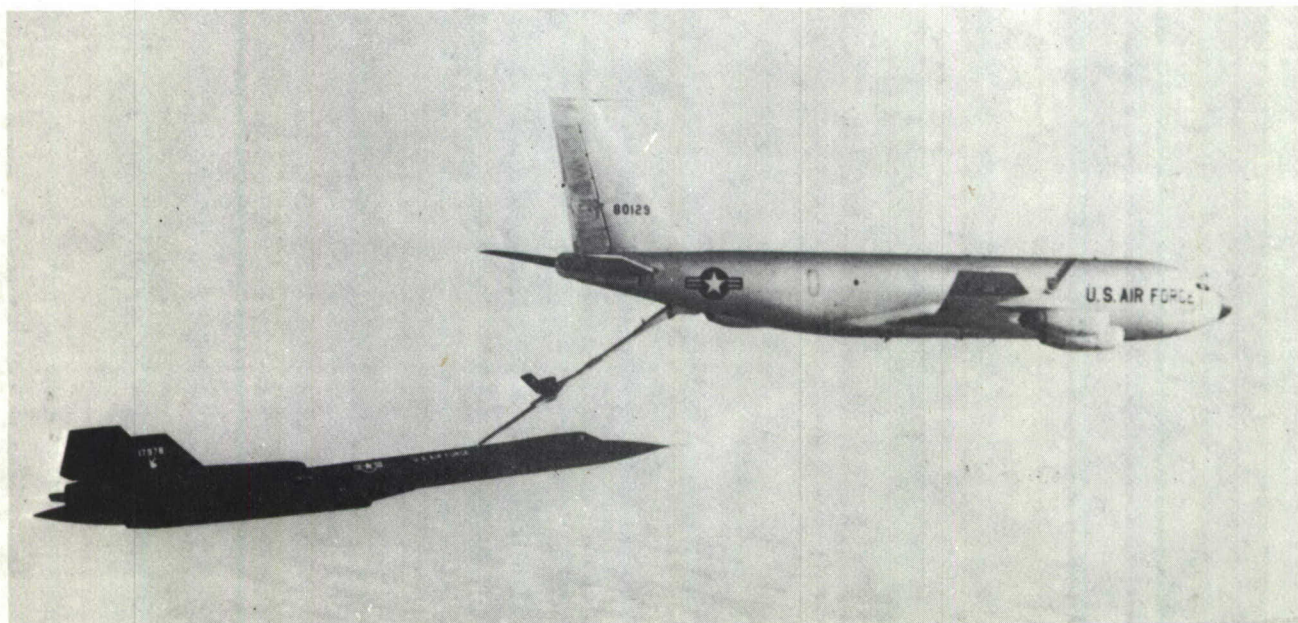
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KC-135 Refueling RC-135

Figure 18

SR-71 Giant Scale photo reconnaissance missions were refueled by tankers based at Kadena AB, Okinawa.



KC-135 Refueling SR-71

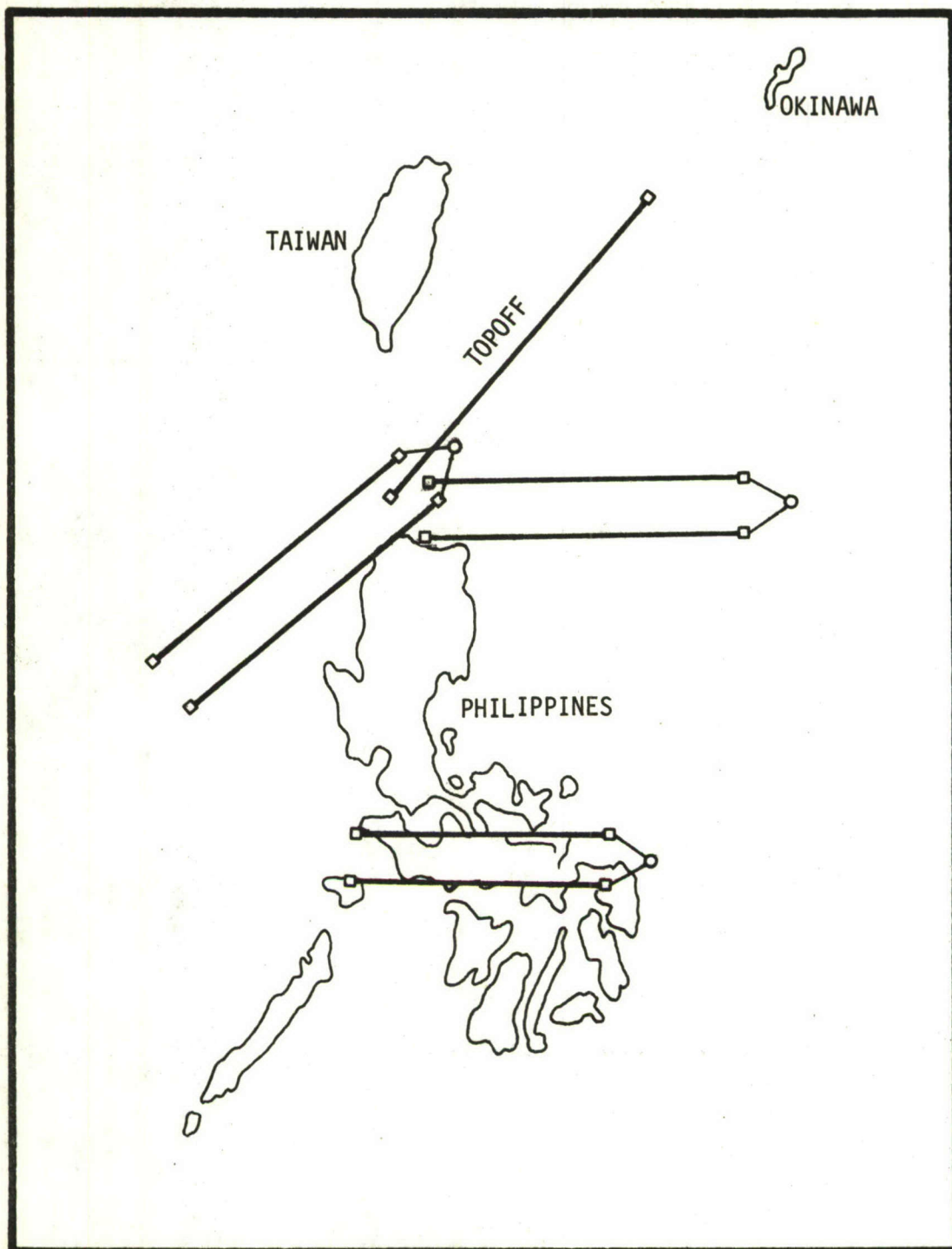
Figure 19

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ARC LIGHT REFUELING AREAS

FIGURE 16

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SUPPLEMENTAL SUPPORT

Airborne radio relay missions were flown by especially configured KC-135s. Their purpose was to extend the UHF radio range of the Tactical Air Control System (TACS). The modification was a data relay link system and a UHF radio relay system.^{38/} The tanker served as an orbiting satellite, providing radio relay of SAM, MIG and border violation warnings as well as target diverts and recalls. These KC-135s remained on station for long orbit periods and were available for emergency refuelings.^{39/}

Tankers were used for proficiency training of tactical units whose normal SEA mission did not require refueling.^{40/} By the summer of 1970, all B-52 Arc Light missions were flown from Thailand. This made it necessary to fly training sorties for both B-52 and KC-135 crews to maintain proficiency in their primary mission which remained strategic bombardment and refueling in support of the Single Integrated Operations Plan (SIOP).^{41/}

The intratheater movement of both B-52s and tactical forces was usually supported by tankers that were deploying or redeploying.^{42/} In addition, personnel and cargo were regularly moved across the Pacific and intratheater by KC-135s. Several Military Airlift Command (MAC) Special Assignment Airlift Missions (SAAMs) were flown into Southeast Asia by the tankers.^{43/}

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REFUELING NAVY AIRCRAFT

Emergency air refueling of Navy aircraft engaged in SEA operations was provided, although no preplanned refuelings were ever scheduled. A spectacular refueling of U.S. Navy aircraft occurred in what was believed to be the first tri-level hookup ever conducted. The narrative which follows was extracted from a message sent by Third Air Division to CINCSAC. ^{44/}

A tanker launched on a routine Young Tiger mission in the Gulf of Tonkin. Immediately after arriving on station, the U.S. Navy requested Air Force assistance for emergency refueling of naval aircraft supporting strike and RESCAP operations in NVN. The tanker's scheduled mission was air refueling Air Force F-104s in the Gulf of Tonkin. The refueling area was provided radar coverage by both AF GCI sites and Navy shipborne radars. The tanker aircraft arrived on station and established communications with two F-104 aircraft, FALSTAFF 21 and 22. Immediately thereafter, GCI Water Boy advised tanker to contact PIRAZ (Position Identification Radar Advisory Zone) Ship "Red Crown", a Navy CRC in the Gulf of Tonkin, for possible emergency and vectoring KC-135 tanker north to intercept Holly Green Blue and Holly Green White, Navy A-3 tanker from carrier Hancock. The F-104s escorted tanker north to provide MIG cover. F-104s received periodic refueling enroute. After reverifying emergency, flight descended to 5000 feet and entered holding at 20-34N 107-23E, approximately 43 NM ESE of Haiphong. The rendezvous was completed with two Navy A-3 tankers. One A-3 had three minutes usable fuel, due to 4000 pounds being trapped which was transferable but could not be burned. 2,300 pounds were offloaded to the first A-3 who then moved into observation position permitting the second Navy A-3 to refuel. During this refueling a TACAN rendezvous was made for another emergency refueling involving two Navy F-8s call sign Pageboy from the carrier BonHomme Richard. The most

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critically low on fuel of these aircraft had 300 pounds remaining and could not wait for the A-3 tanker then in contact with KC-135 to finish air refueling. F-8 number one immediately made contact with the A-3 tanker and effected successful transfer while the A-3 was hooked up and taking fuel from KC-135 tanker. Simultaneously, the number one A-3 shared a portion of his meager onload with F-8 number two and later took additional fuel from the KC-135. In the midst of this emergency Red Crown advised of still another involving Taproom, a flight of two Navy F-4s, who stated they had insufficient fuel to return to the carrier Constellation. Red Crown vectored the entire cell toward the rendezvous. Initial refueling contact was made with Taproom 1 and offload was made to both F-4s on a southerly heading. Due to low fuel the tanker proceeded to Da Nang AB. Red Crown furnished vectors, while two F-104 cover aircraft were again refueled before returning to their base. The KC-135 landed at Da Nang with 10,000 pounds fuel remaining. Following is a resume of offload by sequence and quantity:

FALSTAFF 22	1.4M
FALSTAFF 21	2.9M
FALSTAFF 22	2.3M
Holly Green Blue	2.3M
Holly Green White	14.9M - Pageboy 2 qty unk
Holly Green Blue	14.0M - Pageboy 3 qty unk
FALSTAFF 21	2.0M
FALSTAFF 22	1.1M
Taproom 2	3.0M
Taproom 1	3.0M
FALSTAFF 21	1.5M
FALSTAFF 22	1.5M
TOTAL	49.9M

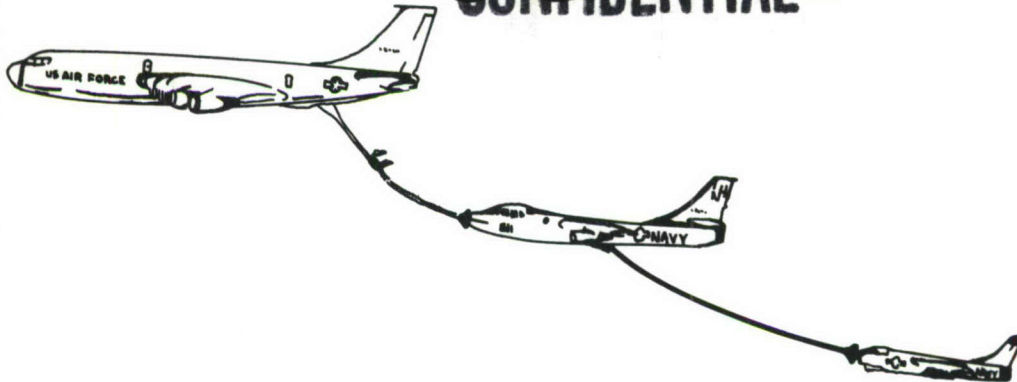
In summation, six Navy aircraft were saved through emergency action taken. During all refuelings the tanker remained clear of land mass and in radio contact with GCI, keeping that agency informed of fuel status and emergency refueling progress. Pilot states Red Crown advised many fuel emergencies in progress due to RESCAP and strike activities. It appears that action taken by tanker crew was appropriate and timely. Good judgment was demonstrated throughout entire mission.

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Tri-Level Refueling

Figure 20

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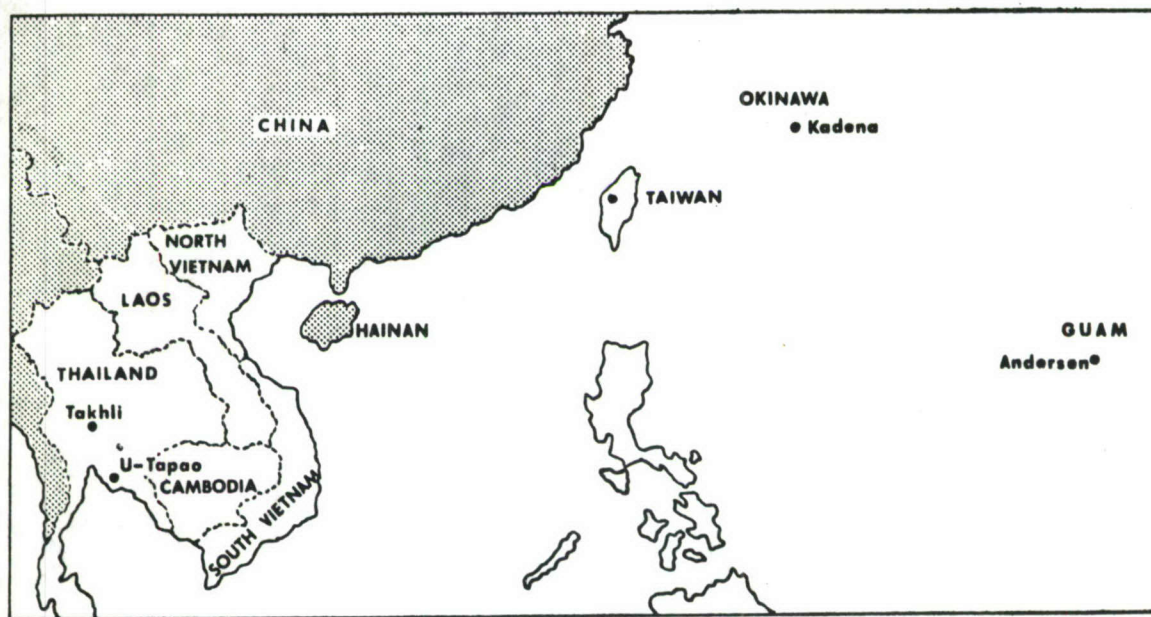
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CHAPTER III

DEPLOYMENT OF THE TANKER TASK FORCE



Area of Operating Locations

Figure 21

FOREIGN LEGION 1964

The first aerial refuelings in support of SEA combat employment occurred when four KC-135 tankers gave prestrike refuelings to eight F-100s on 9 June 1964. The tankers and their receivers were part of the Yankee Team Task Force operating from Clark AB, Philippines against targets in Laos. These tankers were withdrawn on 15 June after having flown only the one support mission. The Gulf of Tonkin Incident precipitated the deployment of another Tanker Task Force of eight aircraft to Clark on 6 August.

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This tanker force, nicknamed "Foreign Legion," flew its first combat support sorties on 28 September. Foreign Legion support continued throughout the remainder of the year and established the value of providing an in-theater refueling capability for tactical air operations. ^{45/}

The buildup of forces in SEA had saturated facilities at Clark. A Main Operating Base (MOB) with longer runways, pit refueling and the capability to handle greater numbers of large aircraft on a sustained basis was essential to the refueling mission. ^{46/} In October, surveys were made to determine potential bases of operation for the tanker force. The next month, a Programming Conference (Tamale Pete) was held at Hickam AFB, Hawaii. A Joint SAC-PACAF Programmed Action Directive (PAD) was developed from the Tamale Pete conference providing for the establishment of a MOB for tankers at Kadena AB, Okinawa, and a Forward Operating Location (FOL) at Don Muang AB, Thailand. ^{47/} By the end of the year the Tanker Task Force had flown 237 sorties in support of tactical operations, completed 948 refuelings and transferred 11,900,000 pounds of fuel inflight. ^{48/}

YOUNG TIGER 1965

The 4252nd Strategic Wing was activated at Kadena on 12 January 1965. The primary mission of the wing was aerial refueling in support of SEA tactical operations under the nickname Young Tiger. Fifteen tankers were attached and their first sorties were flown on 25 January. In mid-February, 30 additional tankers began to arrive, raising the strength of the tanker force to 45. The new arrivals had supported the deployment of Arc Light

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B-52s to Andersen AFB, Guam. At this time, the mission of the Kadena wing was expanded to include refueling support for Arc Light. The Forward Operating Location (FOL) at Don Muang was activated with four tankers on 2 March and nicknamed Tiger Cub. With 45 tankers operating from two locations, closer coordination of refueling activities became necessary, and a SAC Liaison Office (SACLO) was established at Second Air Division Headquarters, Tan Son Nhut Airfield, on 14 March. Arc Light bombing began on 18 June 1965 with thirty KC-135s from Kadena providing the fuel needed by the B-52s for the roundtrip from Guam to their SEA targets.^{49/} Three tankers were based at Takhli AB, Thailand in mid-September. This second FOL became the nucleus of the King Cobra Task Force. A month later the Takhli force was increased to six. On 15 November this King Cobra force was formally organized as Detachment 1 of the 4252nd Strategic Wing and the number of aircraft increased to ten. King Cobra, supplemented by Tiger Cub, permitted a majority of the refueling of Thailand based tactical aircraft by tankers from the FOLs. This alleviated the inefficiency of flying long enroute distances from Okinawa to the refueling areas over Thailand.^{50/} The basing of KC-135s at Takhli created several logistical problems. Aircraft parking space and maintenance facilities were very limited. In addition, the ten tankers had a daily fuel consumption of 200,000 gallons.^{51/} A cumbersome combination of rail, pipeline and trucks was used to transport fuel to the base; however, the tactical advantages gained from the Thailand-based tankers exceeded the logistical problems encountered.^{52/} Young Tiger sortie lengths were reduced from an average

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of seven and a half hours, for those operating from Kadena, to four hours. Equally important, the fuel available for offload was doubled.^{53/} In calendar year 1965, sortie totals surged to 9,282 with 31,250 refuelings completed and 314,500,000 pounds of fuel transferred.^{54/}

GIANT COBRA 1966

An ever increasing number of tactical refuelings were being flown. Major portions of the strike force were based in Thailand; therefore, it became necessary to locate additional tankers in that area. Airfield congestion and logistical support problems ruled out the use of any existing base in Thailand. Negotiations were made with the Royal Thai Government (RTG) to develop the Royal Thai Navy Airfield at Sattahip into an MOB for tactical refueling operations. The base was ideally situated and became known as U-Tapao AB. Its location was within five miles of a natural deep water harbor that was developed into a major port capable of handling the massive logistical requirements.

During February, Second Air Division requested refueling support of night operations for the first time. The ground facilities at Takhli and Don Muang were not adequate to support tanker night operations; consequently, night sorties were flown exclusively from Kadena until U-Tapao became operational later in the year.

During the entire period of this report, no tankers were lost to enemy action. The extension of mobile surface-to-air missile (SAM) sites into the Laotian border area and southern coastal regions of North Vietnam

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began to pose a threat to the highly vulnerable tankers refueling in those areas. Normal planning provided a 50-NM buffer zone between refueling areas and known or suspected sites. On 7 March, a RESCAP tanker was vectored to within a lethal 10 nautical miles of a suspected SAM site but escaped unscathed.

Five additional KC-135s were deployed to Takhli in June raising the total Task Force inventory to 60. These tankers were deployed to support an increase in the daily Young Tiger sortie rate and maintain an Arc Light rate of 450 sorties a month. Operations were impaired during this period because of main runway repairs at Kadena. The secondary runway's shorter length imposed restrictions which reduced the tanker fuel loads. A temporary FOL was established at Clark during this period and 85 refueling sorties were launched from there during the period of the Kadena repairs. ^{55/}

The 4258th Strategic Wing Task Force was organized at U-Tapao. The first tanker arrived there on 7 August and Giant Cobra operations were begun immediately. ^{56/} Earlier negotiations with the RTG had limited the number of Thailand-based tankers to 25, but on 15 August the limit was raised to 35. By September the Task Force at U-Tapao had 15 tankers assigned. ^{57/} Southeast Asia refueling sorties for 1966 totaled 18,203 with 78,946 refuelings completed and 856 million pounds of fuel offloaded by the tanker force. ^{58/}

ESCALATION 1967

U-Tapao became a MOB for KC-135s at the beginning of the year. Two newly fitted radio relay aircraft using the nickname Combat Lightning

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were first put into service in January. The level of SEA activity had extended beyond the scope of a liaison office and the new year also saw the establishment of a SAC Advanced Echelon (ADVON) at Tan Son Nhut Airfield, RVN. The ADVON coordinated with 7AF and provided the tanker units with daily fragmentary orders outlining sortie requirements. The 4258th at U-Tapao was designated as a full-fledged Strategic Wing on 1 February and operational control of the King Cobra detachment at Takhli AB was transferred from the 4252nd Strategic Wing at Kadena. The separation of primary refueling responsibilities was now complete. The tanker unit based on Okinawa was to support refueling of B-52 Arc Light missions and SAC reconnaissance sorties, leaving the Thailand-based tankers responsible for Young Tiger refuelings. At this time the Young Tiger sortie rate was 40 a day with 35 refueling tankers assigned to the 4258th. Actually, the Young Tiger force was able to support surges up to a rate of 48 per day.

U-Tapao received the first five of an RTG approved force of 15 B-52 Arc Light aircraft on 10 April. The plan and operation of emplacing B-52s in Thailand was nicknamed Poker Dice. By the end of June, the bomber force had risen to ten aircraft. The last increment of five arrived at U-Tapao on 10 July.^{59/} The Poker Dice deployment had two major advantages; fewer losses of perishable targets and a reduction of required refueling support. The Kadena tankers continued refueling the reduced number of Andersen-based bombers. Another change in operating locations was made in anticipation of the arrival in Southeast Asia of F-111s for combat test in operation Combat Lancer. The base selected for Combat Lancer was Takhli and the

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congestion there would eventually force the movement of the King Cobra aircraft. Poker Dice had saturated U-Tapao and space was not available there. In August, Ching Chuan Kang (CCK) AB, Republic of China (Taiwan) was surveyed for tanker use and plans were made for its development as an FOB. In the meantime, the withdrawal of the King Cobra tankers was being delayed until the Combat Lancer deployment became a reality. The Pueblo incident actually activated operations at CCK before Combat Lancer was implemented.

CINCPAC requested an increase in the Young Tiger sortie rate above the limit of 48 which the 4258th could support. Supplemental Young Tiger sorties were flown by the 4252nd Strategic Wing and the increase went into effect in August.^{60/} The year-end statistics reflect the greatly expanded operations. More than one billion pounds of fuel were transferred to over 100,000 receivers during 1967.^{61/}

PORT BOW 1968

The seizure of the U.S.S. Pueblo by North Korea in January brought rapid response in the form of "Port Bow" deployments. Port Bow placed additional B-52s and tankers in the WESTPAC area as a show of force. However, once in place, the aircraft were used to increase the Arc Light sortie rate in support of the Khe Sanh campaign.

Again the problem of airfield congestion affected the tanker force because the Port Bow B-52s and tankers were based at Kadena. Fortunately, plans had previously been made for the use of CCK. The 4220th Air Refueling

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Squadron (AREFS) was activated there under the operational control of the 4252nd Strategic Wing. The new unit was assigned ten tankers from Kadena and five which were formerly based in Thailand. The Kadena-launched bombers required much less refueling support than those based on Guam. Normally, one tanker was used to "top off" three bombers enroute from Okinawa to RVN. The one-to-one ratio remained in effect for the Andersen bombers. The B-52s striking from U-Tapao did not require refueling support.

Young Tiger activity paralleled the increase in bomber refueling because of Operation Niagara in support of the battle of Khe Sanh and the general step up in response to the 1968 TET offensive. The detachment at Takhli was closed on 2 March and the King Cobra aircraft were moved to U-Tapao. The movement of the radio relay aircraft to CCK provided some of the space needed to support the additional tankers based in Thailand. Operation Pegasus, also in support of Khe Sanh, was in full swing by April and with good weather, coupled with the supplement of Port Bow tankers, contributed to another surge in refueling activity.^{62/}

During August, 7th AF proposed that an additional radio relay orbit be flown over Thailand. Established in September, it was short-lived because of the threat to an aircraft in static orbit. The 1 November cessation of air operations against North Vietnam had little effect on the total air refueling requirements because this date also marked the launching of the air interdiction campaign in Southern Laos.^{63/} The year 1968

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represented the pinnacle of Arc Light operations and the 1,642,900,000 pounds of fuel transferred inflight represents the largest total recorded. ^{64/}

DE-ESCALATION BEGINS 1969

Kadena and U-Tapao were designated MOBs for B-52s in January. Reduction of the Arc Light refueling support allowed the withdrawal of ten tankers from the force at Kadena and the allocation of 40 tankers based at U-Tapao to meet 7th AF requirements. The Commando Hunt interdiction campaign in Laos, Cambodia, and RVN conducted during the Northeast Monsoon season was supported by the U-Tapao tankers. Although several typhoons occurred during the summer months, no degradation of sortie rates occurred while the tankers operated from their evacuation bases. In October the number of refuelings for Andersen-based bombers was reduced to five missions per day. At the same time, the number of tankers deployed to support tactical receivers was reduced. ^{65/}

By the end of the year, the tanker force was reduced to 66 aircraft. The number of sorties flown was down to 27,866, a reduction of over 4,000 from the previous year. The average fuel offload on each sortie increased to 61,160 pounds from 54,200 for the previous year. This increase in offload was a reflection of the shift in emphasis from the Barrel Roll area in Northern Laos to the Steel Tiger area in the Laos panhandle. This shift moved the focal point of refueling operations closer to the MOB at U-Tapao thus providing more fuel for offload while flying fewer sorties. In 1969 the tankers transferred more than 1,400,000,000 pounds of fuel. ^{66/}

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THE WINDDOWN CONTINUES, 1970

The first quarter of 1970 brought further reductions in Young Tiger sortie rates. This provided a much needed breathing spell after four years of intensive operations at U-Tapao. The base's single runway had been worn to the point where aircraft were experiencing serious vibrations during takeoff. The decrease in sortie rates allowed operations to be curtailed at U-Tapao while the runway there was resurfaced. Ten tankers were detached to Takhli AB and four to CCK during March leaving the runway available for resurfacing operations during the day. Night operations continued to be conducted from U-Tapao because of lighting deficiencies at Takhli and CCK. Third Air Division became 8th AF (SAC) on 1 April and the 4252nd at Kadena and the 4258th at U-Tapao were redesignated as the 376th and 307th Strategic Wings. The daily sortie rate was again reduced in August and a phase-down of tanker operations at CCK was begun. The same month, B-52 strikes from Andersen were terminated and a withdrawal of bombers from Kadena began. In September all B-52 Arc Light activity was transferred to U-Tapao. This eliminated the requirement for Arc Light refueling and six years of refueling in support of saturation bombing came to an end.

By November, the 4220th AREFS was phased out when the last tanker left CCK. The Kadena tankers retained several supplemental tasks but their only mission in direct support of SEA operations was refueling Giant Scale and Combat Apple reconnaissance aircraft.^{67/} The Vietnamization program, coupled with bombing halts in North Vietnam and

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the relocation of the Arc Light bombers, had a great influence in reducing air refueling operations back to the 1966 level. The fuel delivered inflight by SAC tankers totalled only 882,000,000 pounds in 1970.^{68/}

SUMMARY

The use of jet aerial tankers to refuel tactical aircraft had been limited to deployments until 1964. In Southeast Asia, air refueling of fighters employed in combat operations was conducted for the first time. The support documents, interviews and statistics forming the basis of this CHECO report lead to the following generalizations:

1. Aerial refueling was central to the employment of air operations as they were conducted in SEA.
2. The KC-135 aircraft was ideally suited for the refueling mission; however, a more powerful engine would have made better use of its potential.
3. The logistical support requirements imposed by large tanker aircraft limits the number of usable bases.
4. Large scale refueling operations demand airspace sanctuaries which are not subject to AAA, SAM, and fighter interception.
5. The professional performance of the tanker crews was a major factor in the sustained success achieved.

During the period of this report, 1964-1971, 129,929 aerial refueling sorties were flown in support of SEA operations, 568,360 refuelings were conducted and 6,180,600,000 pounds of fuel were offloaded to receiver aircraft.

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28. (S) SAC OPLAN 18-71, "Young Tiger", 1 Jul 1970
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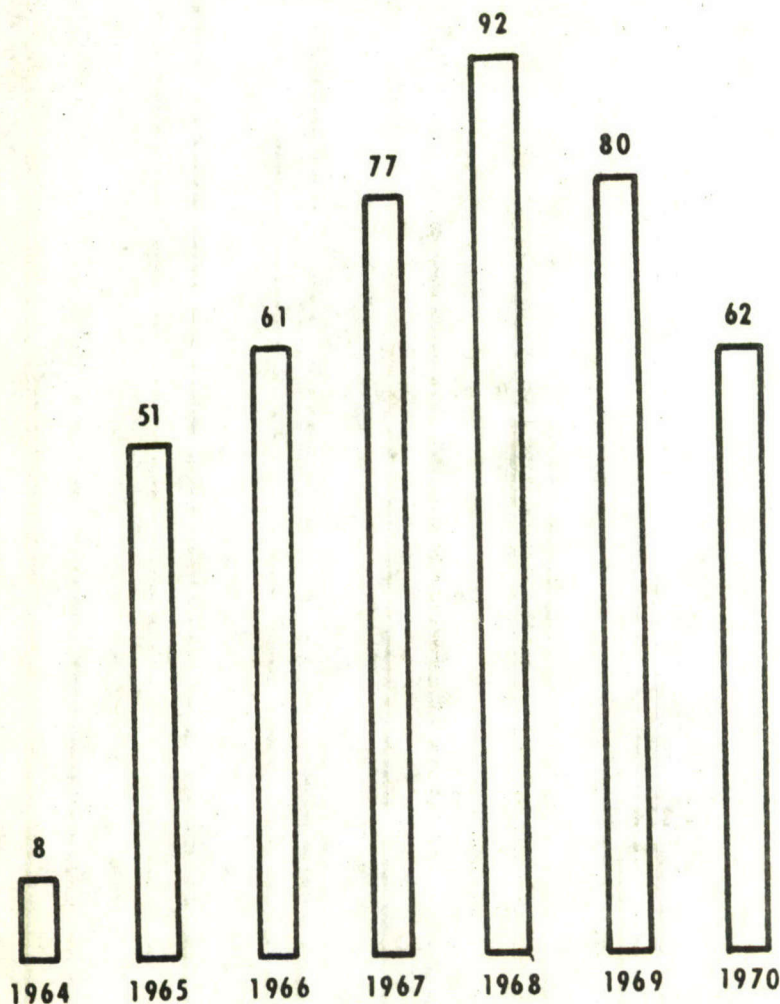
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APPENDIX I

AVERAGE NUMBER OF KC-135 AIRCRAFT EMPLOYED



SOURCE: KC-135 Southeast Asia Blue Page Summary (S) 31 Dec 1970

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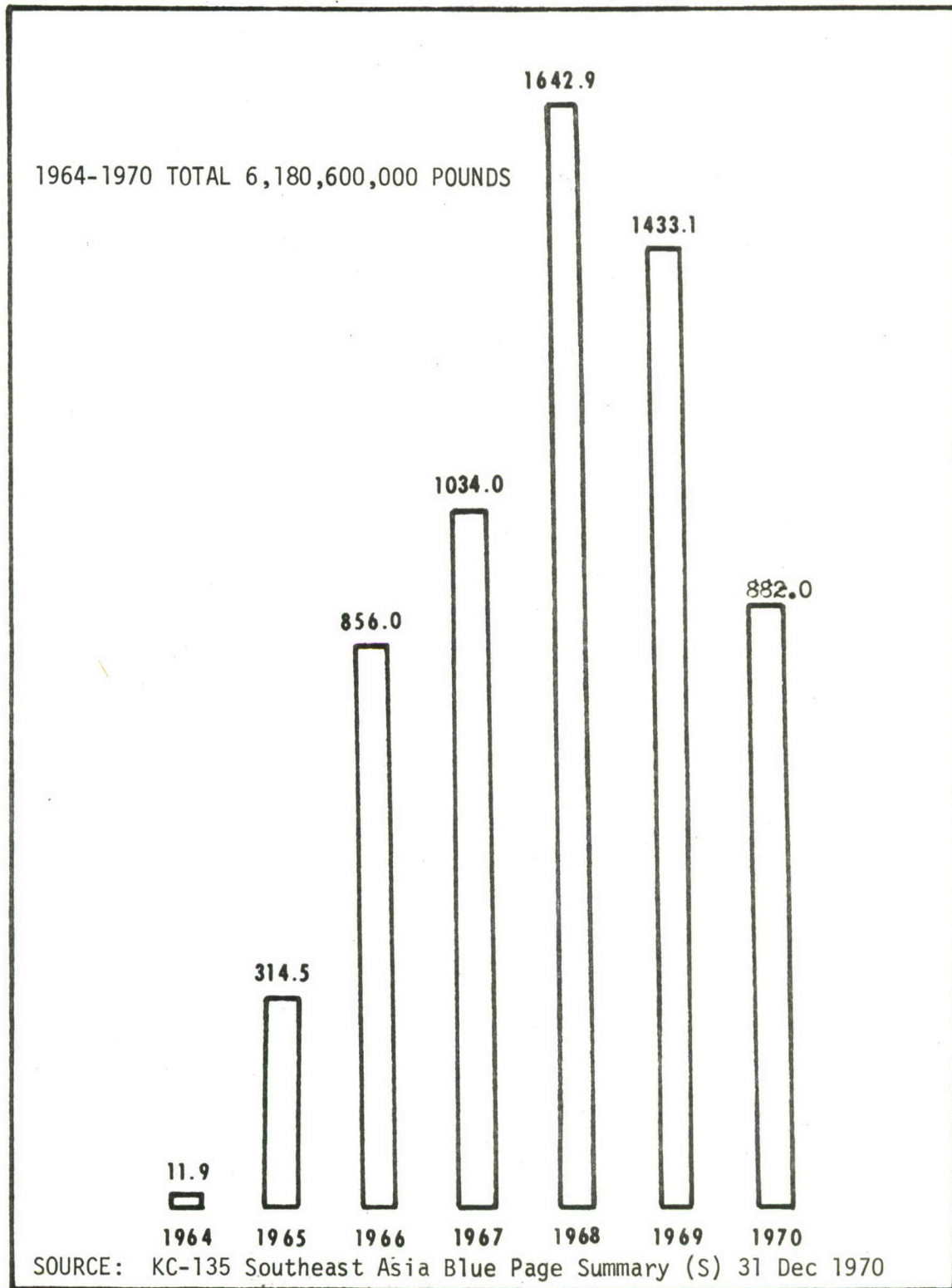
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APPENDIX II

FUEL OFFLOADED IN MILLIONS OF POUNDS



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APPENDIX III

SEA REFUELING SORTIES FLOWN

	<u>ARC LIGHT</u>	<u>STRAT RECON</u>	<u>TAC AIR</u>	<u>RELAY</u>	<u>OTHER</u>	<u>TOTAL</u>
1964	-	-	237	-	0	237
1965	1800	-	6987	-	495	9282
1966	6719	-	10938	-	546	18203
1967	7276	-	13181	808	1626	22891
1968	10510	1216	17121	828	2325	32000
1969	5241	1488	18327	746	2064	27866
1970	<u>1750</u>	<u>1202</u>	<u>12640</u>	<u>746</u>	<u>3112</u>	<u>19450</u>
TOTAL	33296	3906	79431	3128	10168	129929

SOURCE: KC-135 Southeast Asia Blue Page Summary (S) 31 Dec 1970

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APPENDIX IV

SEA REFUELINGS*

	<u>ARC LIGHT</u>	<u>STRAT RECON</u>	<u>TAC AIR</u>	<u>RELAY</u>	<u>OTHER</u>	<u>TOTAL</u>
1964	-	-	948	-	0	948
1965	1646	-	28477	-	1127	31250
1966	5879	-	73067	-	0	78946
1967	7224	-	94406	69	1717	103416
1968	13096	1203	107562	5	7339	129205
1969	6464	1438	126593	0	3669	138164
1970	<u>2802</u>	<u>1176</u>	<u>77810</u>	<u>0</u>	<u>4643</u>	<u>86431</u>
TOTAL	37111	3817	508863	74	18495	568360

*The average refueling sortie flown in SEA resulted in 4.37 refuelings.
Aircraft recycling for "top off" are reported as one refueling.

SOURCE: KC-135 Southeast Asia Blue Page Summary (S) 31 Dec 1970

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APPENDIX V

AIR REFUELING SQUADRONS SUPPORTING SEA OPERATIONS

7th AREFS	92d AREFS	906th AREFS
9th AREFS	93d AREFS	908th AREFS
11th AREFS	97th AREFS	909th AREFS
22d AREFS	99th AREFS	911th AREFS
28th AREFS	305th AREFS	912th AREFS
32d AREFS	306th AREFS	913th AREFS
34th AREFS	310th AREFS	915th AREFS
41st AREFS	343d AREFS	916th AREFS
42d AREFS	380th AREFS	917th AREFS
43d AREFS	407th AREFS	919th AREFS
46th AREFS	509th AREFS	920th AREFS
70th AREFS	903d AREFS	922d AREFS
71st AREFS	904th AREFS	924th AREFS
91st AREFS	905th AREFS	

SOURCE: Reports and Analysis Branch 376th Strategic Wing (U)

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GLOSSARY

AB	Air Base
AD	Air Division
ADVON	Advanced Echelon
AFB	Air Force Base
AIR DIV	Air Division
Anchor Refueling	Air refueling performed in a prescribed pattern anchored to a geographical point
Arc Light	B-52 Operations in SEA
ARCP	Air Refueling Control Point
ARCT	Air Refueling Control Time
AREFS	Air Refueling Squadron
ARIP	Air Refueling Initial Point
Bingo Fuel	An established minimum fuel requirement
CCK	Ching Chuan Kuang AB, Republic of China
CINCPAC	Commander-in-Chief, Pacific Command
CINCSAC	Commander-in-Chief, Strategic Air Command
Combat Apple	SAC RC-135 Elint Collector based at Kadena
Combat Lancer	The F-111 operation test
Combat Lightning	Nickname applied to the project designed to provide the 7AF Commander with a semiautomated command and control system for "Real Times" control of tactical air operations over North Vietnam
Commando Hunt	Interdiction campaign for air operations in Laos
COMUSMACV	Commander, U.S. Military Assistance Command, Vietnam
CONUS	Continental United States
CRC	Control and Reporting Center
Desert Strike	Strike Command Tactical Employment Exercise 1964
DF	Direction Finding
ELINT	Electronic Intelligence
FOB	Forward Operating Base
FOL	Forward Operating Location
Foreign Legion	Nickname designating aerial tankers flying in support of Yankee Team 1964
FRAG or FRAG ORDER	A fragmentary Operations Order is the daily supplement to the standard Operations Orders governing the conduct of the air war in SEA. It contains mission number and function, type of ordnance, TOT, and refueling instructions

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GCI	Ground-Controlled Intercept
Giant Cobra	KC-135 Tanker Operations based at U-Tapao AB, Thailand
Giant Scale	SAC conducted aerial reconnaissance of SEA by SR-71 aircraft
IFR	Instrument Flight Rules
King Cobra	KC-135 Tanker operations based at Takhli AB, Thailand
MAC	Military Airlift Command
MIG	Communist Jet Fighter
MOB	Main Operating Base
Niagara	The Air Force participation in the battle of Khe Sanh (18 Jan thru 31 Mar 1968)
NM	Nautical Mile
NVN	North Vietnam
Orbit	A circular pattern flown by an aircraft
PACAF	Pacific Air Forces
PAD	Programmed Action Directive
Pegasus	A combined U.S., RVN, and Australian air ground operation with the objective of relieving the pressure on Khe Sanh. It was started on 31 Mar 1968 as a successor to Niagara II
PIRAZ	Positive Identification Radar Advisory Zone. A U.S. Navy radar control ship in the Gulf of Tonkin
Poker Dice	Plan and operation of emplacing B-52s at U-Tapao, Thailand
Port Bow	Deployment of B-52, KC-135 force to Kadena AB, Okinawa as a show of force following Pueblo Incident
Receiver	An aircraft taking or intending to take on fuel from an aerial tanker
Recycle	Procedure whereby receivers keep full fuel loads awaiting drop-off time by repeated top-off refuelings
RESCAP	Rescue Combat Air Patrol
RTG	Royal Thai Government
RZ	Rendezvous Point
SAAMS	Special Assignment Airlift Missions
SAC	Strategic Air Command
SAC/ADVON	Strategic Air Command Advanced Echelon
SACLO	Strategic Air Command Liaison Office
SAM	Surface-to-Air Missile
SEA	Southeast Asia

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SIF	Selective Identification Feature
SIOP	Single Integrated Operations Plan
SW	Strategic Wing
TAC AIR	Used to encompass all aircraft sorties other than B-52s and strategic airlift
TACAN	Tactical Air Navigation
TACS	Tactical Air Control System
Tamale Pete	Air Refueling Planning Conference Hickam AFB, Hawaii, Nov 1964
TDY	Temporary Duty
TET	Lunar New Year Holiday observed in Vietnam and other Oriental countries early in the Occidental year
Tiger Cub	KC-135 task force operating from Don Muang AB, Thailand
UHF	Ultra High Frequency
VFR	Visual Flight Rules
WESTPAC	Western Pacific
Yankee Team	U.S. Air Reconnaissance in Laos from May 1964
Young Tiger	KC-135s Tanker aircraft supporting SEA tactical operations

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